

Eagle Pass, Texas, Udden referred thus to furrowings on their surfaces: "In very rare cases one may see etched grooves radiating from the elevated center of one of the flattened surfaces of these boulders."<sup>10</sup> This no doubt is but a reversal of the direction of flow of the dissolving water that produces the Sun Symbol mark. Again quoting Udden: "This radiated, furrowed sculpture is one of the most common sculpture forms seen on the bare limestone surfaces in situ in this part of America." This suggests that he had recognized radial patterns caused by an outward flow of water.<sup>11</sup>

So far no cusped potholes or radial erosion marks have been reported from humid regions<sup>12</sup> where on similar rocks marginal erosion may exceed that taking place over the central portion and the surfaces tend to become convex. In arid or semi-arid climates the marginal areas may receive a protecting deposit of salts, concentrated there by the wick-like action of the rim during the process of solution by rain water and its subsequent evaporation, and so develop concave surfaces.

BOTANY.—*New species of Paspalum from Tropical America.*<sup>1</sup> AGNES CHASE, Bureau of Plant Industry.

Three of the species here proposed belong to the Decumbentes, a group of *Paspalum* characterized by the development of the first glume in the lower of the pair of spikelets, sometimes in the upper also. The species, except *P. nutans* Lam. which is found also in Mauritius, are confined to the American tropics and warm temperate regions.

*Paspalum Hintoni* Chase, sp. nov.

Perenne; culmi ascendentes, 30–45 cm alti, compressi; vaginae carinatae; laminae planae, 3–6 cm longae, 2–5 mm latae, hirsutae; racemi solitarii, longe pedunculati, terminales et axillares, 4–7 cm longi; spiculae geminae, 2.2–2.3 mm longae, 1.2 mm latae, glabrae; gluma prima nulla aut minutissima, gluma secunda spiculam dimidiam subaequans; lemma sterile 3-nerve; fructus subtilissime papilloso-striatus.

Perennial, in small tufts; culms ascending, slender, compressed, 30–45 cm tall, the nodes appressed-pubescent; sheaths compressed-carinate, ciliate

<sup>10</sup> UDDEN, J. A. *Flattening of limestone gravel boulders by solution.* Geol. Soc. America Bull. 25: 66–68. 1914.

<sup>11</sup> Large steep-sided sandstone boulders in the Dog Canyon area of the Guadalupe Mountains show these centrifugal troughs. Also where the dolomitic anhydrites of the Rustler formation are exposed in the Pecos Valley a fine display of large well-developed vertical rills is to be seen.

<sup>12</sup> HUMMEL, K. *Lösungserscheinung auf Kalkstein an der dalmatinischen Küste.* Natur und Museum 62: 381–382. 1932. A solution figure (sun symbol) developed in limestone on the Dalmatian coast under conditions simulating those of a semi-arid climate.

<sup>1</sup> Received January 28, 1937.

on the margin and hirsute at summit; ligule about 0.7 mm long; blades flat, spreading, 3 to 6 cm long, 2 to 5 mm wide (the uppermost reduced) papillose-hirsute on both surfaces; racemes solitary, terminal and axillary, on long slender peduncles, usually two from the uppermost sheath, 4 to 7 cm long, subarcuate, the rachis about 1 mm wide, pubescent at the very base, otherwise glabrous; spikelets in pairs, 2.2 to 2.3 mm long, about 1.2 mm wide, slightly purple tinged; first glume obsolete on both spikelets of the pair or developed as a very minute truncate scale on a few spikelets; second glume about half as long as the spikelet, 3-nerved; sterile lemma rather firm in texture, 3-nerved, its membranaceous palea well developed but empty; fruit about 2.1 mm long, pale, minutely papillose-striate.

Type in the U. S. National Herbarium no. 1611719, collected at 1,080 meters altitude at Vigas, Temascaltepec District, State of Mexico, Mexico, September 22, 1932, by George B. Hinton (no. 1807). This is part of a single specimen received for study from Kew Herbarium and returned to that institution.

The species is closely related to *Paspalum pilosum* Lam., and *P. Peckii* F. T. Hubb., differing from both chiefly in the smaller spikelets and short second glume. It differs also in that the first glume is alike in both spikelets of the pair, whereas in *P. pilosum* and *P. Peckii* the first glume is unequally developed in those of the pair.

#### ***Paspalum Altsoni* Chase, sp. nov.**

Perenne; culmi ramosi, decumbentes; laminae planae, 5–11 cm longae, 5–11 mm latae; pedunculi 2–4 e vagina suprema; racemi solitarii, 2–5 cm longi; spiculae geminae, 2.5–2.7 mm longae, circa 1.5 mm latae; gluma prima spiculae superioris parva, ea spiculae inferioris quam spicula 2–4-plo brevior; gluma secunda et lemma sterile 5-nervia, gluma quam lemma brevior; fructus subtilissime papilloso-striatus.

Perennial in small tufts; culms spreading or prostrate, freely branching, the branches somewhat divergent; sheaths loose, shorter than the internodes, or the lower overlapping, glabrous or the margin ciliate toward the summit; ligule about 2 mm long; blades flat, 5 to 11 cm long, 5 to 11 mm wide (the uppermost somewhat reduced), slightly narrowed to a rounded base, very sparsely pilose on the upper surface near the base or glabrous, the margin finely fluted below, the pale midnerve prominent beneath; peduncles 2 to 4 from the upper and middle sheaths, subfiliform, finally long-exserted, the later axillary ones concealed in the sheaths until the maturity of the primary racemes; racemes solitary, 2 to 5 cm long, straight or slightly arcuate, the rachis slender, slightly channeled; spikelets in pairs, the pairs somewhat distant, 2.5 to 2.7 mm long, about 1.5 mm wide, elliptic-obovate; first glume small and nerveless on the upper spikelet of the pair, 1-nerved, subacute and one-quarter to one-half as long as the spikelet on the lower spikelet, both glabrous or with a few weak hairs; second glume and sterile lemma 5-nerved, rather firm in texture, with a few scattered hairs or glabrous, the glume slightly shorter than the spikelet; fruit nearly the size of the spikelet, pale-stramineous, minutely papillose-striate.

Type in the U. S. National Herbarium no. 1539437, collected in moist sandy crevices on rocks in the open, at about 75 meters altitude, Macreba Falls, "Kurapung River," in the upper Mazaruni District, British Guiana, September 3, 1925, by R. A. Altson (no. 392).

In this species the habit and foliage resemble those of *Paspalum decumbens* Swartz and *P. nutans* Lam., but the spikelets are larger with the first glumes of the pair dissimilar as in *P. pilosum* Lam. and its close allies.

***Paspalum petilum* Chase, sp. nov.**

Perenne; culmi graciles, ascendentes, 15–22 cm alti, foliosi; laminae planae, 3–10 cm longae, 3–4 mm latae, glabrae; pedunculi 2–3 ex vagina suprema; racemi solitarii, terminales et axillares, 1–2.5 cm longi, arcuati; spiculae geminae, 1.7–1.8 mm longae, circa 1.1 mm latae; gluma prima parva, obtusa, in margine pubescens; gluma secunda et lemma sterile pubescentia; fructus subtilissime papilloso-striatus.

Perennial in small tufts; culms slender, ascending or spreading, 15 to 22 cm tall, leafy throughout, the uppermost blade often equaling the inflorescence; nodes appressed-pubescent to glabrescent; sheaths mostly overlapping, densely pubescent along the margin and on the collar; ligule about 1 mm long; blades flat, 3 to 10 cm long, 3 to 4 mm wide, tapering to the often folded base, glabrous, the pale midnerve prominent beneath; peduncles 2 or 3 from the upper sheath, filiform; racemes solitary, 1 to 2.5 cm long, arcuate, the rachis slender, slightly channeled; spikelets in pairs, scarcely crowded, 1.7 to 1.8 mm long, about 1.1 mm wide, elliptic-ovate; first glumes similar on the spikelets of the pair, short, obtuse, nerveless, pubescent on the margin; second glume and sterile lemma 3-nerved or obscurely 5-nerved, sparsely pubescent, the glume two-thirds or three-fourths as long as the spikelet; fruit about 1.6 mm long, pale, very minutely-papillose-striate.

Type in the U. S. National Herbarium no. 1298462, collected on wet rocks, China Creek, Konawaruk River [County of Essequibo], British Guiana, September 1906, by A. W. Bartlett (Bot. Gard. Georgetown Herb. no. 8569).

In habit this species resembles *Paspalum dispar* Chase, of Hispaniola, but differs in having smaller pubescent spikelets and first glumes similar on the spikelets of the pair. In *P. dispar* the glume on the lower spikelet is about two-thirds as long as the spikelet.

***Paspalum ionanthum* Chase, sp. nov.**

Perenne, caespitosum; culmi ascendentes, 15–40 cm alti, paucifolii; vaginae compressae; laminae planae aut subinvolutae, 0.5–8 cm longae; racemi 2, subconjugati, ascendentes, 3–5.5 cm longi; spiculae solitariae, 3.4–3.7 mm longae, circa 1.5 mm latae, ellipticae, glabrae, saepius purpurascens; gluma et lemma sterile aequalia, 5-nervia, minute apiculata; fructus subtilissime papilloso-striatus.

Perennial in dense hard tufts with numerous short leafy sterile shoots at base; culms ascending, compressed, 15 to 40 cm tall, with a single node above the base; sheaths compressed, those of the sterile shoots short, overlapping, sparsely hirsute to glabrous, mostly stiffly ciliate, at least toward the summit, those of the culms longer, glabrous; ligule almost obsolete; blades firm, flat to subinvolute, those of the sterile shoots 5 to 8 cm long, 2 to 5 mm wide, those of the culms 0.5 to 4 cm long, all ciliate at the very base; racemes 2, subconjugate, ascending, 3 to 5.5 cm long, the rachis about 0.8 mm wide, with a few hairs at base, otherwise glabrous, one of the pair usually naked at the very base; spikelets solitary, 3.4 to 3.7 mm long, about

1.5 mm wide, elliptic, glabrous, mostly purple-tinged; glume and sterile lemma equal, rather firm in texture, 5-nerved, minutely apiculate at the subacute apex; fruit pale, about the size of the spikelet, minutely papillose-striate.

Type in the U. S. National Herbarium no. 1037280, collected in the region of Lake Ypacaray, in central Paraguay, in December 1913, by Dr. E. Hassler (no. 12383).

This species belongs in the *Notata* group and is most nearly related to *P. alnum* Chase, of Texas, southern Brazil, and Paraguay. It differs from that in the numerous short sterile shoots, the shorter much firmer blades, in the shorter stiffer racemes, and in the larger spikelets. The type collection was named by Dr. Hassler as a variety of *Paspalum notatum* Flügge. The varietal name is unpublished and cannot be used as a specific name because it is preoccupied.

*Paspalum alnum* was described<sup>2</sup> from Texas. At the time I hesitated to cite the South American specimens, but further study leaves no doubt that they belong to the same species as the Texas material. Three racemes are not infrequent in the South American specimens and in one specimen there are 5 and in another 6 racemes. A specimen of this species, No. 21 *Plantae Pilcomayenses*, collected in 1906 in the Gran Chaco by Theodore Rojas, custodian of the Hassler Herbarium, was described by Hackel as *Paspalum ovale* Nees var. *apiculatum* Hack.<sup>3</sup> An examination of Nees' type of *P. ovale*, in the Berlin Herbarium, shows that it is not the species to which Hackel applied the name. The name "apiculatum" could not be used because it is preoccupied by *P. apiculatum* Doell, 1877.

The following South American specimens are referred to *Paspalum alnum*:

BRAZIL: Porto Esperança, on Rio Paraguay, Matto Grosso, Chase 11078, 11095, 11109.

PARAGUAY: Gran Chaco, Rojas 21. Puerto Santa Rita, Rojas 2675 (*Hort. Paraguayensis* 11071). Rio Verde, Herter 4831. San Bernardino, Rojas 1660. Lake Ypacaray, Hassler 12334.

URUGUAY: Santa Rosa Cuareim, Herter 336 i (*Herter Herb.* 82565).

ARGENTINA: Mercedes, Prov. Corrientes, Parodi 6370. Formosa, Parodi 2936 (collector unknown).

ZOOLOGY.—*North American monogenetic trematodes. I. The superfamily Gyrodactyloidea.*<sup>1</sup> EMMETT W. PRICE, U. S. Bureau of Animal Industry.

Genus DAITREOSOMA Johnston and Tiegs, 1922

*Diagnosis*.—Body with constriction about one-third of length from an-

<sup>2</sup> This JOURNAL 23: 137, fig. 1, 1933.

<sup>3</sup> Repert. Sp. Nov. Fedde 6: 341. 1909.

<sup>1</sup> Continued from This JOURNAL, 27: 114-130. 1937.